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09/662,045	09/15/2000	Stefan Vilsmeier	SCHWP0129US	5003

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Don W. Bulson, Esq.
Renner, Otto, Boisselle & Sklar, LLP
19th Floor
1621 Euclid Ave.
Cleveland, OH 44115

EXAMINER

KIM, CHONG R

ART UNIT

PAPER NUMBER

2623

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/662,045	VILSMEIER ET AL.
Examiner	Art Unit	
Charles Kim	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on ____.

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-17 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-17 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 15 September 2000 is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

1. Certified copies of the priority documents have been received.

2. Certified copies of the priority documents have been received in Application No. _____.

3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) Notice of References Cited (PTO-892) 4) Interview Summary (PTO-413) Paper No(s). _____ .
2) Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) Notice of Informal Patent Application (PTO-152)
3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ . 6) Other: _____ .

DETAILED ACTION

Drawings

1. The drawings are objected to because they are not of sufficient quality for publication.

Claim Objections

2. Claims 12 and 13 are objected to because the phrase "wherein the mapped shape of said object..." in lines 1-2 lacks antecedent basis. It appears that the applicant intended the phrase to read "wherein the shape of said object...". Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 11, the phrase "for example" (e.g.) renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 5, 13-14, 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakagawa et al., U.S. Patent No. 5,151,609 (“Nakagawa”).

Referring to claim 1, Nakagawa discloses a method of detecting the shape of an object comprising the following steps:

- a. producing a camera image of the object (col. 3, lines 47-50)
- b. mapping an outline of the object, the outline appearing sharp in the image, in a first plane by means of an analyzer (9, 10, 11) connected to the camera (col. 4, lines 2-30 and figure 1. Note that Z1 is interpreted as the “first plane”). Nakagawa explains that focus measures $Fi(x, y)$ are determined for each focal plane Zi ($i=1\dots n$), wherein the focus measures are calculated from a contrast image obtained from each respective focal plane. Nakagawa further explains that the focal plane Zp on coordinate z where the focus measure becomes maximum is obtained with respect to all coordinate points (x, y) , and are used to determine the heights of all points on the object surface, thereby obtaining an image of the solid shape object [col. 5, lines 59-65]. Note that $Zp(x, y)$ represents the z -coordinate value of the focal plane that includes a point on the object surface at (x, y) [figure 2 (c) and (d)]. Therefore, all the points on the object surface are determined for each focal plane (Zi). The Examiner notes that determining

the points of the object surface for each focal plane (the points on the object surface having the same Z_p values) is analogous to mapping an outline of the object in each focal plane, since the points $Z_p(x, y)$ in each focal plane represents a cross section of the object surface at a particular height ($z = Z_p$), wherein the cross section is characterized by a plane that includes all the points of the object surface intersecting that plane, thereby forming an outline of the object surface.

Nakagawa further discloses:

- c. altering the focus distance of the camera (col. 3, lines 55-61)
- d. mapping a sharp outline of the object in a second plane (Z_2) by means of an analyzer [col. 3, line 61-col. 4, line 6. See also the discussion in regards to (b) above]
- e. repeating steps b) to d) until a sufficient number of outlines has been mapped so that the three-dimensional shape of the object can be established (col. 3, line 55-col. 4, line 6 and col. 8, lines 38-48).

Referring to claim 2, Nakagawa further discloses that the differences in contrast are mapped to establish which outline appears sharpened in the image (col. 4, lines 2-30 and col. 5, lines 7-25).

Referring to claim 5, the claims use of "or" between two limitations requires the prior art to meet either one of the limitations. In this case, Nakagawa further discloses that the analyzer (9, 10, 11) used is preferably a computer including an image processing program, in which analog signals captured by the camera are digitized and then processed (col. 4, lines 31-46 and col. 8, lines 40-56).

Referring to claim 13, Nakagawa further discloses that the shape of the object is used to produce an image which is sharp at any depth [col. 8, lines 37-48. Nakagawa explains that the

Zp values are used to display an image of the solid shape object. The Examiner notes that the solid shape image obtained from the Zp values is sharp at any depth, since Zp is the coordinate z (depth) where the focus measure becomes maximum for all coordinate values (x, y), see col. 5, lines 59-63].

Referring to claim 14, see the rejection of at least claim 1 above.

Referring to claim 16, see the rejections of at least claims 2 and 5 above.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 3, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al., U.S. Patent No. 5,151,609 (“Nakagawa”), further in view of Morgan, U.S. Patent No. 5,381,236 (“Morgan”).

Referring to claim 3, Nakagawa explains that the camera is a video camera (col. 3, lines 47-50), but fails to explicitly state that the camera has a very small depth of sharpness. However, video cameras with very small depth of sharpness were exceedingly well known in the art. For example, Morgan discloses a video camera that has a very small depth of sharpness (field) [col. 1, lines 13-17].

Nakagawa and Morgan are both concerned with obtaining a three dimensional image of an object. Morgan explains that a video camera with very small depth of sharpness provides an accurate image slice, thereby resulting in an accurate three-dimensional image of the object (Morgan, col. 1, lines 17-21). Therefore, it would have been obvious to modify the video camera of Nakagawa, so that it has a very small depth of sharpness, as taught by Morgan, in order to increase the accuracy in detecting the three-dimensional shape of the object, thereby enhancing the shape detection process.

Referring to claim 15, see the rejection of at least claim 3 above.

6. Claim 4 rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al., U.S. Patent No. 5,151,609 (“Nakagawa”), further in view of the applicant’s admitted prior art (“Admission”).

Referring to claim 4, Nakagawa fails to teach that markers are applied to the object to highlight specific points on the object for identification. However, applying markers to an imaged object for identification purposes was exceedingly well known in the art. For example, Admission states that markers on an object are included during the imaging process, in order to provide positional information in regards to specific points on the object (page 1 of the applicant’s specification).

Nakagawa and Admission are both concerned with detecting the three-dimensional shape of an object. Therefore, it would have been obvious to apply the markers of Admission in the method of Nakagawa, in order to enhance the shape detection process by providing additional information in regards to the location and the shape of the object.

7. Claims 6, 7, 10-11, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al., U.S. Patent No. 5,151,609 (“Nakagawa”), further in view of Cabib et al., U.S. Patent No. 6,088,099 (“Cabib”).

Referring to claim 6, Nakagawa fails to teach that the camera is used on a surgical microscope. However, cameras used on surgical microscopes were exceedingly well known in the art. For example, Cabib explains that most medical imaging devices are built with an attachment for a video camera, more specifically a video camera built on a surgical microscope (col. 15, lines 49-50 and lines 53-57).

Nakagawa and Cabib are both concerned with image processing methods. Cabib’s method allows real time display of analyzed tissue, and storage of the tissue images for later retrieval and patient follow-up. Therefore, it would have been obvious to use the camera of Nakagawa in the surgical microscope of Cabib, in order to expand the flexibility of the system, while enhancing the diagnostic/surgical process.

Referring to claim 7, Nakagawa fails to teach that the shape of a patient body part to be treated is mapped as the object.

Cabib teaches that a shape of a patient body part to be treated is mapped as an object for imaging, wherein the shape is processed by a navigation system (video camera built on a surgical microscope) monitoring the treatment zone in order to incorporate the outer shape of the body part in navigation [col. 15, lines 49-65. Note that the video camera built on the surgical microscope is interpreted as a “navigation system” because it provides the surgeon with a real time display of the tissue being treated, and aids the surgeon before, during or after surgery to accurately define the diseased tissue to be removed, and further provides aid in the decision on

where to start cutting and where to stop (col. 19, lines 25-32). Cabib also explains that the navigation system is utilized for border detection of a patient body part (col. 15, line 66-col. 16, line 13). The Examiner notes that determining the border of a patient body part will include determining its shape].

Nakagawa and Cabib are both concerned with image processing methods. Cabib's method allows real time display of analyzed tissue, and storage of the tissue images for later retrieval and patient follow-up. Therefore, it would have been obvious to modify the method of Nakagawa so that the object to be imaged is the shape of a patient body part, and the shape is processed by a navigation system monitoring the treatment zone in order to incorporate the outer shape of the body part in navigation, as taught by Cabib, in order to expand the flexibility of the system, while enhancing the diagnostic/surgical process.

Referring to claim 10, Cabib further discloses that the navigation system is used for location referencing in surgical operations (col. 19, lines 25-32).

Referring to claim 11 as best understood, Cabib further discloses that the shape of the body part is assigned to that shape determined by a preoperative scan to permit compensation (col. 19, lines 25-32 and lines 51-53).

Referring to claim 17, see the rejection of at least claim 6 above.

8. Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al., U.S. Patent No. 5,151,609 ("Nakagawa"), in view of Cabib et al., U.S. Patent No. 6,088,099 ("Cabib"), further in view of the applicant's admitted prior art ("Admission").

Referring to claim 8, Nakagawa and Cabib both fail to teach that at least one marker detectable by the navigation system is applied to the object to assign the location and shape of the object in the navigation system.

However, applying markers to an imaged object for assigning the location and shape of the object was exceedingly well known in the art. For example, Admission teaches markers detectable by a navigation system that are applied to the object to assign the location and shape of the object in the navigation system via the position of the at least one marker as also captured by the camera (page 1 of the applicant's specification).

Nakagawa, Cabib, and Admission are all concerned with detecting the shape of an object. Therefore, it would have been obvious to apply the markers of Admission in the method of Nakagawa and Cabib, in order to enhance the shape detection process by providing additional information in regards to the location and shape of the object.

Referring to claim 9, see the rejection of at least claim 8 above. Note that the "at least one marker" noted above, is interpreted as being analogous to "at least one fixed point" on the object.

9. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al., U.S. Patent No. 5,151,609 ("Nakagawa").

Referring to claim 12, Nakagawa explains that the shape of the object is obtained from Z_p values, wherein Z_p is the coordinate z (depth) where the focus measure becomes maximum for all coordinate values (x, y) , as noted above. Note that for a selected plane ($Z_i=z$), the Z_p values can be used to automatically provide a focused plane, since the Z_p values having the

selected z coordinate value ($Z_p=z$) will include the maximum focus measure for all coordinate values (x, y) in the selected plane (col. 5, lines 59-65).

However, Nakagawa fails to teach that a user defines the plane. Official notice is taken that it was exceedingly well known for users to define a plane in an object image. Therefore, it would have been obvious for a user to define a plane in the object image of Nakagawa, in order to enhance the flexibility of the system by allowing the user to analyze specific portions of the object image for further processing. Therefore, if the user defines a plane, the shape of the object (Z_p values) can be used to automatically focus the selected plane.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Mimura et al. U.S. Patent No. 5,305,092 discloses an apparatus for obtaining the three-dimensional shape of an object by imaging the object at different focal planes.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Kim whose telephone number is 703-306-4038. The examiner can normally be reached on Monday thru Thursday 8:30am to 6:00pm and alternating Fridays 9:30am to 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 703-308-6604. The fax phone numbers for the

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organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-0377.

ck

ck
July 23, 2003

Jon Chang
Jon Chang
Primary Examiner